WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, comprising:

forming a first insulating layer on a semiconductor substrate;

forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;

forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;

forming a via hole by selectively patterning the second insulating layer in order to expose a certain portion of the first conductive line; and

removing a natural oxide layer, formed on the first conductive line through natural oxidation of the first conductive line, by plasma-processing the natural oxide layer using H_2+CO gas.

2. The method of claim 1, wherein the first conductive line is formed of copper.

3. The method of claim 1, wherein the plasma-processing is performed at room temperature.

4. A method of manufacturing a semiconductor device, comprising:

forming a first insulating layer on a semiconductor substrate;

forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;

forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;

forming a via hole by selectively patterning the second insulating layer in order to expose a certain portion of the first conductive line; and

removing a natural oxide layer, formed on the first conductive line through natural oxidation of the first conductive line, by heat treating in an H_2+CO gas atmosphere.

5. The method of claim 4, wherein the heat treatment is performed at room temperature to 200°C.

6. A method of manufacturing a semiconductor device, comprising:

forming a first insulating layer on a semiconductor substrate;

forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;

forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;

forming a via hole and a trench by selectively patterning the second insulating layer to expose a certain portion of the first conductive line;

forming a metal barrier by depositing a metal layer on top of the substrate including in the via hole and on the trench;

forming a copper seed layer on top of the metal barrier; and

removing a natural copper oxide layer, formed on the copper seed layer through natural oxidation of the copper oxide layer, by plasma-processing the natural copper oxide layer using H_2+CO gas.

7. The method of claim 6, wherein the plasma-processing is performed at room temperature.

8. A method of manufacturing a semiconductor device, comprising:

forming a first insulating layer on a semiconductor substrate;

forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;

forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;

forming a via hole and a trench by selectively patterning the second insulating layer to expose a certain portion of the first conductive line;

forming a metal barrier by depositing a metal layer on top of the substrate including in the via hole and on the trench;

forming a copper seed layer on top of the metal barrier; and

removing a natural copper oxide layer, formed on the copper seed layer through natural oxidation of the copper oxide layer, by heat treating in an H_2+CO gas atmosphere.

9. The method of claim 8, wherein the heat treatment is performed at room temperature to 200°C.

10. A method of manufacturing a semiconductor device, comprising:

forming a first insulating layer on a semiconductor substrate;

forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;

forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;

forming a via hole and a trench by selectively patterning the second insulating layer to expose a certain portion of the first conductive line;

forming a metal barrier by depositing a metal layer on top of the substrate including in the via hole and on the trench;

depositing a conductive material for forming a conductive line on top of the substrate including on the metal barrier to sufficiently fill the via hole and the trench;

forming a plug and a second conductive line by planarizing the conductive material on the second insulating layer in order to expose the second insulating layer; and

removing a natural oxide layer, formed on the second conductive line through natural oxidation of the second conductive line, by plasma-processing the natural oxide layer using H_2+CO gas.

11. The method of claim 10, wherein the second conductive line is formed of copper.

12. The method of claim 10, wherein the plasma-processing is performed at room temperature.

13. A method of manufacturing a semiconductor device, comprising:

forming a first insulating layer on a semiconductor substrate;

forming a first conductive line by depositing a conductive material on the first insulating layer and selectively patterning the conductive material;

forming a second insulating layer by depositing an insulating material on top of the substrate including on the first conductive line;

forming a via hole and a trench by selectively patterning the second insulating layer to expose a certain portion of the first conductive line;

forming a metal barrier by depositing a metal layer on top of the substrate including in the via hole and on the trench;

depositing a conductive material for forming a conductive line on top of the substrate including on the metal barrier to sufficiently fill the via hole and the trench;

forming a plug and a second conductive line by planarizing the conductive material on the second insulating layer in order to expose the second insulating layer; and

removing a natural oxide layer, formed on the second conductive line through natural oxidation of the second conductive line, by heat treating in an H_2+CO gas atmosphere.

14. The method of claim 13, wherein the heat treatment is performed at room temperature to 200°C.